CANADA
DEPARTMENT OF MINES
GEOLOGICAL SURVEY BRANCH
Hon. W. Templeman, Minister; A. P. Low, Deputy Minister;
R. W. Brock, Director.

MEMOIR No. 11-T

TRIANGULATION
AND
SPIRIT LEVELING
OF
VANCOUVER ISLAND
BRITISH COLUMBIA
1909

BY

R. H. Chapman

1842

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To R. W. Brock, Esq.,

Director Geological Survey,

Department of Mines.

Sir,—I beg to submit the following memoir on the Triangulation of Vancouver island, B.C., made during the year 1909.

I have the honour to be, sir,

Your obedient servant,

R. H. CHAPMAN.

Ottawa, April 2, 1910.

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ILLUSTRATION.

Diagram showing Triangulation of Vancouver island, B.C., 1909.

TRIANGULATION AND SPIRIT LEVELING

OF

VANCOUVER ISLAND, BRITISH COLUMBIA

1909

BY

R. H. Chapman

TRIANGULATION.

Triangulation was extended from the vicinity of Victoria, about eighty miles up the island, to points northward and southward from Cowichan lake.

Preliminary observations were made to Mt. Arrowsmith, and several stations were located near Nanaimo for the control of a large scale topographic map of that vicinity.

The observations were made with a Bausch and Lomb Optical Co. theodolite with 8 inch circle, reading by micrometer microscopes to two seconds. Signals were built on all primary, and several secondary stations before observations were made. The centre of each station is marked in a permanent manner, and several witness marks were usually placed on each station.

Observations for azimuth were made on Gonzales Hill station near Victoria, by sights to Polaris.

The latitude, longitude, and distances, depend upon values furnished by the United States Coast and Geodetic Survey for two points near Victoria. These values are for stations on Discovery island and Gonzales hill, and are reduced to the "U. S. Standard" : which is a mean value of many astronomical stations widely distributed over North America, and tied together by triangulation.

All observations of the primary stations have been adjusted by the least square method,

The work was done under my direction by Mr. S. C. McLean, with Mr. T. B. Williams as assistant.

The data contained in the following statement, are arranged under three heads:—

Primary Stations—Points upon which signals were erected, permanent marks left, and observations made. (Symbol ▲.)

Secondary Stations—Points upon which signals were erected, permanent marks left, but no observations made. They are computed from more than one unclosed triangle. (Symbol △.)

Intersected Points—Objects not signalled but cut in from primary stations, and computed from one or more unclosed triangles. (Church spires, lighthouses, etc.) (Symbol ⊙.)

Saltspring (Admiral) island.

About five miles northwest of the town of Sidney, on the southwestern slope of Mt. Tuam on the southern end of Saltspring island. The station is about 100 feet below, and about 300 yards southwest of the highest point of Mt. Tuam.

Centre—¾ inch drill hole, 1½ inch deep, surrounded by a triangle, in solid rock.

Witness No. 1.—A copper nail and burr, marked G. S. C., in root of blazed fir tree, 3 feet diameter, 36 feet north of centre.

Witness No. 2.—Ditto, in top of stump of balsam fir 15 inches diameter 87·4 feet northwest of centre.

Latitude, 48° 43′ 35″·25. Longitude, 123° 29′ 06″·75.

To Station.	Azimuth.			Back Azimuth.			Log. Distance.
	°	′	″	°	′	″	Metres.
Jocelyn........	8	11	33·07	188	09	41·53	4·3303280
Conspicuous....	25	34	42·98	205	26	16·86	4·5065787
Koksilah.......	81	40	25·26	261	28	25·12	4·2967834
Witness No. 2..	118	01	.....	...	....	(87·4 feet.)	1·4255272
Prevost........	120	07	45·96	299	55	13·36	4·3727888
Brenton........	126	24	54·90	306	08	35·81	4·5175268
Brenton Bluff..	130	31	58	310	17	14	4·49784
Witness No. 1..	194	28	.....	...	..	.......(36 feet.)	1·0403183
James....	325	58	27·43	146	04	41·91	4·2616565
Zero Rock......	327	27	39	147	36	24	4·42602
Douglas	338	18	14·76	158	24	31·16	4·4450624

Albert.

U.S.C. and G.S. 1869.
G.S.C. 1909.

About six miles southwest of Victoria, on the open grassy slope, with low rocky ledges, of Albert head. It is about 80 feet above the sea, south of a row of trees that reach nearly to the water, and nearly half a mile south of the northernmost point of the head.

Centre.—$\frac{5}{8}$ inch drill hole, 2 inches deep, in solid rock—Eley, London, No. 12 gauge paper shell in hole, established 1869 by U.S.C. and G. S.

Witness.—Copper nail and burr, marked G.S.C., on root of a blazed fir tree 86·8 feet about southwest of centre.

*Note.**—Cannot see southwest, west, or northwest from here.

Latitude, 48° 23′ 16″·649. Longitude, 123° 28′ 38″·916.

To Station.	Azimuth.			Back Azimuth.			Log. Distance.
	°	′	″	°	′	″	Metres.
Witness	19	37	.....	...	..	...... (86·8 feet.)	1·4225355
Gonzales.	75	44	41·40	255	37	49·24	4·0681584
Douglas	219	37	42·83	39	43	37·43	4·1834104
Trial	265	26	22·62	85	34	05·51	4·1063452

Arrowsmith.

(*Not occupied.*)

About thirty miles a little north of west of Nanaimo, on the highest point of Mt. Arrowsmith. A high, sharp, serrated and bare rocky ridge,

Centre.—None.

Latitude 49° 13′ 27″·4. Longitude, 124° 35′ 37″·4.

To Station.	Azimuth.			Back Azimuth.			Log. Distance.
	°	′	″	°	′	″	Metres.
Cottle....	270	17	30	90	44	50	4·64177
Whymper................	313	39	18	133	58	54	4·64123

Benson.

G.S.C. 1909.

About five miles west of Nanaimo on the highest point of the southern of the three rocky knolls of Mt. Benson.

Centre.—A $\frac{5}{8}$ inch drill hole, $1\frac{1}{2}$ inch deep, surrounded by a triangle, in solid rock, on the east side of highest point. An Eley, London, No. 12 paper shell in hole. The rock splintered while drilling.

Witness No. 1.—A wire nail and brass burr, marked G.S.C. △, in top of a blazed dead stump 33·2 feet west of, and 10 to 12 feet lower than centre.

Witness No. 2.—Brass nail and burr, stamped G.S.C. △, in top of blazed stump 59·1 feet northwest of, and 8 to 10 feet below centre.

Witness No. 3.—Ditto, in notch in root of blazed dead fir 60·5 feet on slope north of, and 20 feet below centre.

Witness No. 4.—Arrow on flat sloping rock 10 feet northwest of, and 4 feet below centre.

Latitude, 49° 09′ 00″·56. Longitude, 124° 02′ 58″·48.

To Station.	Azimuth.	Back Azimuth.	Log. Distance-
	° ′ ″	° ′ ″	Metres.
Buffalo	5 17 58	185 17 04	4·19960
Whymper	20 21 09·02	200 16 05·22	4·3716225
Witness No. 1.	82 50	... ... (33·2 feet.)	1·0051539
Witness No. 2	108 27	... . (59·1 feet.)	1·2556033
Witness No. 4	143 02	... .(10·0 feet.)	0·4840158
Witness No. 3	193 45	... . (60·5 feet.)	1·2657712
Cottle	208 05 45·35	28 08 22·00	3·9490841
Entrance Id. lighthouse	249 20 53	69 31 53	4·27546
Nanaimo Post-office	256 02 49	76 07 59	3·93313
Steeple St. Paul's church	256 21 02	76 26 11	3·93001
Steeple Methodist church	258 24 51	78 29 56	3·92044
Coalbank, head frame	264 42 22	84 47 55	3·95155
DeCourcy	283 46 59 54	104 00 38·93	4·3547486
Brenton Bluff	326 49 04	146 59 52	4·50371
Brenton	331 40 46·43	151 49 58·15	4·4965310

Brenton.

G.S.C. 1909.

About fifteen miles northwest of Duncan, on the highest rocky point of a conical timbered mountain of the high, heavily-timbered ridge of Mt. Brenton. This rocky point is about two miles southwest of the part of the ridge described as Brenton Bluff, and is entirely hidden by the timber for short distances over about 100 feet of it. About two miles north of west of station is a higher timbered ridge with two summits, one of which has a rocky cliff.

Centre.—A $\frac{5}{8}$ inch drill hole, $\frac{3}{4}$ inch deep, surrounded by triangle, in solid rock, Eley, London Gas Tight, 12 gauge paper shell loose in hole.

Lines cleared to Prevost, Admiral, Jocelyn, and DeCourcy.

Witness No. 1.—Copper nail and burr, stamped G.S C. △, at foot of blazed hemlock stub, almost dead, 16·6 feet a little east of north of centre.

No. 2—Ditto, at foot of blazed hemlock 6 inches diameter, 19·8 feet a little north of east of centre.

No. 3—Ditto, in top of hemlock stump 3 inches diameter, 34·2 feet southeast of centre.

Latitude, 48° 54′ 05″·946. Longitude, 123° 50′ 47″·734.

To Station.	Azimuth.			Back Azimuth.				Log. Distance.
	°	′	″	°	′	″		Metres.
Waterloo..........	13	41	13·14	193	37	38 80		4·3913960
Whymper..	103	41	39·54	283	27	25·43		4·3752184
Benson	151	49	58·15	331	40	46·43		4·4965310
Cottle............	163	22	18·84	343	15	43·18		4 5686640
DeCourcy	197	52	06·62	17	56	32·96		4·3679185
Witness No. 1......	205	35	.....	...	..	.....	(16·6 feet.)	0 7041239
Witness No. 2......	263	15	.....	...	..	.....	(19·8 feet.)	0·7806810
Witness No. 3......	306	25	.....	...	..	.....	(34·2 feet.)	1·0180419
Admiral.	306	08	35·81	126	24	54·90		4·5175268
Prevost.......... ..	321	23	43·55	141	27	29·82		3·9920883
Koksilah...........	342	37	06·93	162	41	24·72		4·3701664

Brenton (Bluff).

G.S.C. 1909.

(*Not occupied.*)

About ten miles north from Duncan, on the rocky bluff at the northeast end of the ridge of Mt. Brenton, $2\frac{1}{2}$ miles—and visible from the Tyee mine on Mt. Sicker.

No permanent mark.

Latitude, 48° 54′ 35″·6. Longitude, 123° 48′ 41 ·2.

To Station.	Azimuth.			Back Azimuth.			Log. Distance.
	°	′	″	°	′	″	Metres.
Benson	146	59	52	326	49	04	4·50371
DeCourcy	192	10	34	12	13	25	4·33798
Admiral	310	17	14	130	31	58	4·49784
Prevost	337	34	11	157	36	22	3·96822

Buffalo.

G.S.C. 1909.

(Not occupied).

About twelve miles southwest of Nanaimo, on the summit of a mountain about 4,100 feet high, called (limited local use) Buffalo Hump. This mountain lies almost due south of Benson. It is fairly well timbered about the base, and up to an elevation of 3,000 feet, where the timber passes into rock and scrub. The top is formed of a series of bare rocky knolls. The station is on the highest point of the knoll, east of the highest summit, and 8 to 10 feet lower.

Centre.—A triangular $\frac{5}{8}$ inch drill hole, $1\frac{1}{2}$ inch deep, surrounded by a triangle, in solid rock—No. 12 gauge Dominion Sovereign paper shell in hole.

Witness No. 1.—Brass nail and burr, marked G.S.C., in a notch in the root of a blazed stunted pine 18·4 feet west of centre.

Witness No. 2.—Ditto, in top of a blazed, stunted, and contorted pine 20·6 feet north of, and 10 feet lower than centre.

Witness No. 3.—Ditto, in the end of a branch knot close to the root of blazed stunted pine 18·4 feet east of centre.

Witness No. 4.—An arrow, on rock 8·4 feet east of, and about 3 feet lower than centre.

Latitude, 49° 00′ 30″·2. Longitude, 124° 04′ 10″·5.

To Station.	Azimuth.			Back Azimuth.			Log. Distance.
	°	′	″	°	′	″	Metres.
Whymper	46	51	53	226	47	43	3·96416
Benson	185	17	04	5	17	58	4·19960
DeCourcy	246	06	55	66	21	28	4·40887

Conspicuous.

G.S.C. 1909.

About seventeen miles a little north of west of Victoria, on the high, bare, rocky, conical peak which is visible from there. It is the highest point in this part of the island (about 2,200 feet), stands up conspicuously, and cannot be mistaken. The station is on the highest knoll of the southeast part of the rim of the saucer-like top, on a knob of rock about 3 feet south, and 1 foot lower than the highest knob.

Centre.—A $\frac{5}{8}$ inch drill hole, 2 inches deep, surrounded by triangle, in solid rock—a plug of wood loosely in the hole.

Witness No. 1—Copper nail and burr, marked G.S.C. △, in the top of a blazed stump of a pine tree, 20·5 feet west of centre.

Witness No. 2.—Ditto, in top of a blazed pine stump, 19·8 feet northwest of centre.

Witness No. 3.—Ditto, in top of a blazed pine stump, 21·5 feet east of centre.

Witness No. 4.—Arrow chiselled on a knob of rock 16·2 feet southeast of centre.

Latitude, 48° 27′ 57″·20. Longitude, 123° 40′ 21″·52.

To Station.	Azimuth.			Back Azimuth.				Log. Distance.
	°	′	″	°	′	″		Metres.
Witness No. 1..	96	16	.....	...	..	.....	(20·5 feet.)	0·7957697
Waterloo......	*142	48	34·03	*322	37	10·85		*4·4889631
Witness No. 2..	147	30	.....	...	..	.....	(19·8 feet.)	0·7806810
Koksilah.......	167	27	43·38	347	24	10·70		4·4267346
Admiral......	205	26	16·86	25	34	42·98		4·5065787
Douglas	262	37	26·55	82	52	07·42		4·3866167
Witness No. 3..	265	31	.....	...	..	.....	(21·5 feet.)	0·8164543
Witness No. 4..	301	55	.....	...	..	.....	(16·2 feet.)	0·6935308

* Calculated from Geodetic positions.

Cottle.

G.S.C. 1909.

About four miles northwest of Nanaimo and about one mile west of Departure bay, on Cottle hill—a bare rocky knoll about 400 feet high, and three-quarters of a mile east of prominent rock top.

Centre.—A $\frac{5}{8}$ inch drill hole, 2 inches deep, surrounded by a triangle, in solid rock. A No. 12 gauge paper shell (Kynoch, Birmingham) loose in hole.

Witness No. 1.— Brass nail and burr, stamped G.S.C. △, in notch at root of a blazed pine tree, 70·4 feet southeast of centre. A companion pine, and the stump of a third, stand within 3 feet or so, of this one.

Witness No. 2.—Arrow on a rocky knob, 21·0 feet west of centre.

Witness No. 3.—Brass nail, etc., in notch, in root of blazed fir 78·3 feet northwest of, and 15 feet lower than centre.

Latitude, 49° 13′ 14″·48. Longitude 123° 59′ 31″·50.

To Station.	Azimuth.	Back Azimuth.	Log. Distance.
	° ′ ″	° ′ ″	Metres.
Whymper	*22 31 04·24	*202 23 23·86	*4·5100740
Benson	28 08 22·00	208 05 45·35	3·9490841
Witness No. 2	117 30	... . (21·0 feet).	0·8062351
Witness No. 3	125 13	... . (78·3 feet).	1·3777776
Entrance Id. lighthouse	275 07 08	95 15 32	4·13064
DeCourcy	306 41 33·65	126 52 36 89	4·3459122
Nanaimo Post-office	324 28 48	144 31 22	3·85148
Steeple St. Paul's church	325 04 23	145 06 56	3·85268
Coalbank, head frame	326 08 33	146 11 29	3·92729
Steeple Methodist church	327 18 48	147 21 16	3·86562
Witness No. 1	337 23	.. .. (70·4 feet.)	1·3315885
Brenton	343 15 43·18	163 22 18·84	4·5686640

* Calculated from Geodetic positions.

DeCourcy.

G.S.C. 1909.

About twelve miles, a little southeast of Nanaimo, on the northern and largest of the DeCourcy group of islands off the east coast of Vancouver island. The station is on a little camel-back of rock close to the edge of the bluff, on the western shore, and at about the highest point. It is about one-quarter mile south of the residence of Wm. Fluid, owner of the island. Back of, and around the station, is a grove of fir and arbutus trees, entirely clear of underbrush.

Centre.—A $\frac{5}{8}$ inch drill hole, 2 inches deep, surrounded by triangle, in solid rock, and with paper cartridge shell.

Witness No. 1.—Brass nail and burr, in notch in root of blazed arbutus, 33·9 feet north of centre.

Witness No 2—Brass nail and burr, in notch in root of blazed arbutus, 20 feet northeast of station.

Witness No. 3.—Ditto, in notch in root of blazed fir, 25·4 feet southeast of station.

Witness No. 4.—Arrow on same camel-back of rock as, and 9·1 feet southeast of centre.

Latitude, 49° 06′ 04″·59. Longitude 123° 44′ 54″·84.

To Station.	Azimuth.			Back Azimuth.			Log. Distance.
	°	′	″	°	′	″	Metres.
Brenton Bluff.	12	13	25	192	10	34	4·33798
Brenton...........	17	56	32·96	197	52	06·62	4·3679185
Whymper..........	61	18	11·68	240	59	29·83	4·5373687
Buffalo............	66	21	28	246	06	55	4·40887
Benson............	104	00	38·93	283	46	59·54	4·3547486
Cottle.............	126	52	36·89	306	41	33·65	4·3459122
Witness No. 1......	151	48	.....	...	..	..... (33·9 feet.)	1·0142155
Witness No. 2......	236	30	.....	...	..	..... (20·0 feet.)	0·7850458
Witness No. 3......	306	54	.....	...	..	..... (25·4 feet.)	0·8888495
Witness No. 4......	322	17	.....	...	..	..... (9·1 feet.)	0·4430572

Discovery.

U.S.C. and G.S. 1854–1909.
G.S.C. 1909.

About five miles east of Victoria, on the highest part of a rocky bluff, about 200 paces west of north from the lighthouse on Discovery island.

Centre.—A concrete pier 11 by 11 inches, and about 4 feet high.

* Latitude 48°25′ 33″·33. Longitude, 123° 13′ 33″·51.

To Station.	Azimuth.			Back Azimuth.			Log. Distance.
	°	′	″	°	′	″	Metres.
Trial.....................	61	21	23·53	241	17	49·36	3·8268479
Gonzales....	*79	41	29·7	*259	37	04·7	*3·860507
Tolmie, tree..........	115	21	06·00	295	16	40·0	3·907971
Douglas........	130	20	48·55	310	15	25·56	4·0653812
James..................	154	01	48·22	333	56	22·80	4·3081652

* U.S.C. and G.S. position and azimuth.

Douglas.

U.S.C. and G.S. 1854.
G.S.C. 1909.

About five miles north of Post-office, Victoria, on a flat spot on the highest point of Mt. Douglas (locally Cedar hill); about 35 feet north of an old shallow prospect hole.

Centre.—A 1 inch drill hole, 2 inches deep, in solid rock.

Witness No. 1.—Arrow cut in large boulder, 23·5 feet southeast of station.

Witness No. 2.—Copper nail and burr, marked G.S.C., in notch on south side of gnarled, stunted fir, 34·5 feet north-northwest of centre.

Latitude, 48° 29′ 36″·76. Longitude, 123° 20′ 45″·02.

To Station.	Azimuth.			Back Azimuth.			Log. Distance.
	°	′	″	°	′	″	Metres.
Victoria, Parliament bldg	12	00	11	191	59	08	3·92178
Albert	39	43	37·43	219	37	42·83	4·1834104
McDonald	70	55	19	250	45	20	4·24027
Conspicuous	82	52	07·42	262	37	26·55	4·3866167
Jocelyn	109	33	07·61	289	25	00·41	4·1509970
Koksilah	127	42	10·36	307	23	55·17	4·5767465
Witness No. 2	148	04	.....	...	..	(34·5 feet.)	1·0218349
Admiral	158	24	31·16	338	18	14·76	4·4450624
James	179	40	43·60	359	40	41·40	4·0315070
Zero Rock	229	58	46	50	01	14	3·72332
Discovery	310	15	25·56	130	20	48·55	4·0653812
Witness No. 1	318	11	.....	...	..	..... (23·5 feet.)	0·8550838
Trial Id. lighthouse	344	09	09	164	11	01	4·05372
Gonzales	349	49	25·51	169	50	23·32	3·9537576
Victoria, stand pipe	354	19	21	174	19	49	3·89310

Entrance Island Lighthouse.

(*Not occupied.*) G.S.C. 1909.

On Entrance island, a small rocky island about seven miles almost due east of Nanaimo, and one mile north of Gabriola island.

Centre.—Centre of lighthouse tower.

*Latitude, 49° 12′ 34″·9. Longitude, 123° 48′ 26″·7.

To Station.	Azimuth.			Back Azimuth.			Log. Distance.
	°	′	″	°	′	′	Metres.
Benson	69	31	53	249	20	53	4·27546
Cottle	95	15	32	275	07	08	4·13064

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* No check on this position.

Gonzales.

U.S.C. and G.S. 1867–8.

G.S.C. 1909.

About 1·8 miles east of Parliament buildings at Victoria—on the summit of Gonzales or Shotbolts hill, close to wireless mast of Radio Telegraph of the Department of Marine and Fisheries.

Centre.—Brass wood screw in plug, surrounded by a mound of cement about 4 inches high.

Witness No. 1.—A $\frac{5}{8}$ inch drill hole in highest point of rock on summit, 14·8 feet north, and 6·2 feet above centre.

Witness No. 2.–Wireless mast in concrete base, about 132·6 feet north of centre.

Witness No. 3.—Copper nail and washer, marked G.S.C., on root of blazed fir (pine) tree, 31·1 feet south of, and 10 feet below station.

Latitude, 48° 24′ 50″·28.* Longitude, 123° 19′ 27″·78.

To Station.	Azimuth.			Back Azimuth.				Log. Distance.
	°	′	″	°	′	″		Metres.
Albert	75	44	41·40	255	37	49·21		4·0681584
McDonald	99	58	35	279	47	39		4·26240
Victoria Parl. bldg.	101	34	03	281	32	02		3·53070
Jocelyn	132	19	09·76	312	10	05·04		4·3050614
Douglas	169	50	23·32	349	49	25·51		3·9537576
Tolmie Centre	179	42	16·2 **	...	..	.....		.....
Witness No. 1	190	00	.....	...	..	.....	(14·8 feet.)	0·6542775
Witness No. 2	193	05	.....	...	..	.....	(132·6 feet.)	1·6065593
*Discovery	259	37	04·7	79	41	29·7		3·869507
Trial	323	32	12·79	143	33	03·58		3·3712096
Witness No. 3	356	28	.....	...	..	.....	(31·1 feet.)	0·9767762

* Position, azimuth, and Dist., from U.S.C. and G.S. data of Jan. 26, 1910.

** Observed Oct. 13-15, 1909.

James.

About 4½ miles southeast of the town of Sidney on the southwestern end of James island: an island off the east coast of Vancouver island, owned by I. H. Wheatcroft. The station is about 200 feet northeast of three large fir trees, and about 50 to 75 feet above sea-level.

Centre.—A $\frac{5}{8}$ inch drill hole, 2 inches deep, and surrounded by a triangle, in a granite boulder of about 200 pounds weight, level with surface.

Witness No. 1.—Copper nail and burr, marked G.S.C., in root of a blazed arbutus tree, 54 feet north-northeast of centre.

Witness No. 2.—Ditto, in root of a blazed fir, about 202·5 feet southwest of centre.

Witness No. 3.—Ditto, in root of a blazed fir, 181 feet southwest of centre.

Latitude, 48° 35′ 24″·85. Longitude, 123° 20′ 47″·96.

To Station.	Azimuth.			Back Azimuth.				Log. Distance.
	°	′	″	°	′	″		Metres.
Jocelyn	65	38	12·84	245	30	07·49		4·1637404
Witness No. 3.	68	48	.....	...	..	.....	(181 feet.)	1·7416944
Witness No. 2.	74	36	.....	...	..	.....	(202·5 feet.)	1·7904408
Admiral	146	04	41·91	325	58	27·43		4·2616565
Witness No. 1.	222	15	.....	...	..	.....	(54 feet.)	1·2164096
Discovery	333	56	22·80	154	01	48·22		4·3081652
Douglas	359	40	41·40	179	40	43·60		4·0315070

Jocelyn.

G.S.C. 1909.

About twelve miles northwest of Victoria, on the summit of Mt. Jocelyn. This mountain is east of and in the angle of bend of Finlayson arm of Saanich inlet. The station is on the south end of the summit, on a ridge of rock running about north and south, and about 10 feet below the highest point.

Centre.—A 3 inch brass screw in a plug of wood surrounded by conical mound of cement, about 3 inches high.

Witness No. 1-Arrow in surface rock, about 19·1 feet southwest of centre.

Witness No. 2.—A copper nail and burr, marked G.S.C., in the root of a blazed fir (dead), about 111 feet southeast of centre.

Witness No. 3.—Ditto, in root of a blazed jackpine, 65 feet east of station.

Witness No. 4.—Ditto, in root of a blazed fir, 115 feet northeast of station.

Latitude, 48° 32′ 09″·64. Longitude, 123° 31′ 35″·37.

To Station.	Azimuth.			Back Azimuth.				Log. Distance.
	°	′	″	°	′	″		Metres.
Witness No. 1......	45	56	.....	...	..	.....	(19·1 feet.)	0·7650492
Waterloo...........	119	45	32·94	299	27	34·66		4·5297178
Koksilah.	137	51	43·61	317	41	36·03		4·3923301
Admiral	188	09	41·53	8	11	33·07		4·3303280
Witness No. 4......	204	17	.....	...	..	.....	(115 feet.)	1·5447136
James	245	30	07·49	65	38	12·84		4·1637404
Witness No. 3......	262	15	.....	...	..	.....	(65 feet.)	1·2969292
Douglas............	289	25	00·41	109	33	07·61		4·1509970
Victoria, stand pipe	311	25	58	131	34	33		4·27568
Gonzales	312	10	05·04	132	19	09·76		4·3050614
Trial Id. lighthouse.	313	25	20	133	35	19		4·35554
Witness No. 2.....	328	35	.....	...	..	.....	(111 feet.)	1·5293388

Koksilah.

G.S.C. 1909.

About five miles west of Cowichan station on the Esquimalt and Nanaimo railway, on the summit of the bare, rocky, eastern end of Koksilah ridge, at elevation about 2,500 feet. The west end and summit of the ridge are heavily wooded, but the eastern end is rocky and bare, and the eastern slope well burnt over. The station is on the north corner of the highest knob of rock, about three feet north of, and one foot lower than the highest point. Ten feet north is another knob of almost equal height.

Centre.—A $\frac{5}{8}$ inch drill hole, 2 inches deep, in solid rock, surrounded by triangle.

Witness No. 1.–Arrow on a high knob of rock 8·8 feet north of centre.

Witness No. 2.—Brass nail and burr, marked G.S.C. △, in a notch in the root of a blazed and trimmed pine 36 feet east of station.

Witness No. 3.—Ditto, in notch in root of a tall, half dead fir, with branches on the east side only, 60·8 feet southeast of station.

Witness No. 4.—Arrow on highest point of same rock as station, and 3·1 feet south of centre.

Witness No. 5.—Arrow on a flat surface of rock, 16·6 feet west of centre.

Latitude, 48° 42′ 01″·30. Longitude, 123° 45′ 05″·12.

To Station.	Azimuth.			Back Azimuth.				Log. Distance.
	°	′	″	°	′	″		Metres.
Witness No. 4......	28	07	.....	...	..	.....	(3·1 feet.)	9·9753775
Witness No. 5......	78	23	.....	...	..	.....	(16·6 feet.)	0·7041239
Waterloo	83	12	00·73	263	04	09·36		4 1114441
Brenton...........	162	41	24·72	342	37	06·93		4·3701664
Prevost	176	39	06·58	356	38	34·85		4·1682918
Witness No. 1......	178	11	.....	...	..	.....	(8·8 feet.)	0·4284985
Admiral.	261	28	25·12	81	40	25·26		4·2967834
Witness No. 2......	301	56	.....	...	..	.....	(36 feet.)	1 0403183
Douglas..	*307	23	55·17	*127	42	10·36		*4·5767465
Jocelyn.	317	41	36·03	137	51	43·61		4·3923301
Witness No. 3......	326	20	.. ..	...	..	.....	(60·8 feet.)	1·2679194
Conspicuous	347	24	10·70	167	27	43·38		4·4267346

* Calculated from Geodetic position.

McDonald.

(*Not occupied.*) G.S.C. 1909.

About two miles southwest of Goldstream station on the Esquimalt and Nanaimo railway, on a flat rocky knoll on the highest point of the mountain, just west of a grove of large fir trees. Southwest of the station, on a lower knoll, is an old triangulation station, (a pole set in a pile of rocks) probably of Admiralty Survey.

Centre.—A $\frac{5}{8}$ inch drill hole, 2 inches deep, in solid rock.

Witness.—A copper nail and burr, marked G.S.C., in a branch stub of a large blazed fir tree, trimmed to the top, 19 feet southeast of centre.

Latitude, 48° 26′ 32″·0. Longitude, 123° 34′ 04″·6.

To Station.	Azimuth.			Back Azimuth.			Log. Distance.
	°	′	″	°	′	″	Metres.
Conspicuous.............	108	48	46	288	44	04	3·91270
Admiral................	190	53	58	10	57	40	4·50775
Douglas	250	45	20	70	55	19	4·24027
Gonzales	279	47	39	99	58	35	4·26240

* Nanaimo, Coalbank.

G.S.C. 1909.

At the colliery of the Western Coal and Fuel Co., close to their shipping pier at Nanaimo.

Centre.—Centre of the head frame.

Latitude, 49° 09′ 27″·0. Longitude, 123° 55′ 38″·9.

To Station.	Azimuth.			Back Azimuth.			Log. Distance.
	°	′	″	°	′	″	Metres.
Benson...............	84	47	55	264	42	22	3·95155
Cottle...................	146	11	29	326	08	33	3·92729

* Nanaimo, Methodist Church

(*Not occupied.*) G.S.C. 1909.

Methodist church, Wallace street, Nanaimo.

Centre.—The spire.

Latitude, 49° 09′ 54″·5. Longitude, 123° 56′ 15″·9.

To Station.	Azimuth.			Back Azimuth.			Log. Distance.
	°	′	″	°	′	″	Metres.
Benson	78	29	56	258	24	51	3·92044
Cottle....................	147	21	16	327	18	48	3·86562

* Nanaimo, St. Paul's Church.

(*Not occupied*). G.S.C. 1909.

St. Paul's church (Episcopalian), which has a tall slender spire with a rooster weather vane.

Latitude, 49° 10′ 05″·4. Longitude, 123° 56′ 10″·2.

To Station.	Azimuth.			Back Azimuth.			Log. Distance.
	°	′	″	°	′	″	Metres.
Benson..................	76	26	11	256	21	02	3·93001
Cottle	145	06	56	325	04	23	3·85268

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* No check on this point.

*Nanaimo, Post-office.

(*Not occupied*). G.S.C. 1909.

Post-office.

Centre.—Flag staff.

Latitude, 49° 10′ 07″·3. Longitude, 123° 56′ 07″·8.

To Station.	Azimuth.			Back Azimuth.			Log. Distance.
	°	′	″	°	′	″	Metres.
Benson	76	07	59	256	02	49	3·93313
Cottle..................	144	31	22	324	28	48	3·85148

Prevost.

About four miles northwest of Duncan post-office, on the highest point of the the northeast peak of Mt. Prevost, a high, two topped mountain, the rocky scarp of which overlooks the trunk wagon road at Somenos.

Centre.—A $\frac{5}{8}$ inch drill hole, $1\frac{1}{2}$ inch deep, in solid rock, in an angular depression on highest point.

Witness No. 1.—A brass nail and burr, marked G.S.C., in the root of a blazed fir, 76·9 feet northwest of centre.

Witness No 2.—Ditto, in root of a blazed fir, with dead top, 63·4 feet north of centre.

Witness No. 3.—Ditto, in root of a blazed fir, with top off, over the edge of cliff 88·2 feet northeast of centre.

Latitude, 48° 49′ 57″·43. Longitude, 123° 45′ 47″·32.

To Station.	Azimuth.			Back Azimuth.				Log. Distance.
	°	′	″	°	′	″		Metres.
Waterloo..........	36	23	46·27	216	16	26·15		4·3048280
Whymper.........	114	33	06·92	294	15	06·90		4·5059948
Witness No. 1.	120	24	.....	...	..	.....	(76·9 feet.)	1·3699421
Brenton...........	141	27	29·82	321	23	43·55		3·9920883
Brenton Bluff ..	157	36	22	337	34	11		3·96822
Witness No. 2......	177	15	.....	...	..	.....	(63·4 feet.)	1·2861051
Witness No. 3......	229	18	.....	...	..	.....	(88·2 feet.)	1·4294844
Admiral........ ...	299	55	13·36	120	07	45·96		4·3727888
Koksilah	356	38	34·85	176	39	06·58		4·1682918

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* No check on this point.

Tolmie.

U.S.C. and G.S.—1867-9.

(Centre found by G.S.C. in 1909 but used only for an azimuth mark.)

About three miles northeast of Victoria post-office on the summit of the most southern of several rocks of Mt. Tolmie, a prominent hill about 390 feet high. The only natural mark on the hill to which station may be referred is a scrub oak 5 metres northwest of station.

Centre.—A $\frac{5}{8}$ inch drill hole, 2 inches deep, surrounded by triangle, in solid rock.

Latitude, 48° 27′ 25″·23. Longitude, 123° 19′ 28″·98.

To Station.	Azimuth.			Back Azimuth.			Log. Distance.
	°	′	″	°	′	″	Metres.
Albert head	55	52	26·1	235	45	34·8	4·135621
Discovery	295	16	54·2	115	21	20·2	3·907533
Gonzales	359	42	16·4	179	42	17·3	3·679990

Tolmie (Tree).

(*Not occupied*). G.S.C. 1909.

On Mt. Tolmie.—Scrub oak five metres northwest of Tolmie centre of U.S.C. and G.S. The only tree on top of hill.

Latitude, 48° 27′ 25″·3. * Longitude, 123° 19′ 29″·4.

To Station.	Azimuth.			Back Azimuth.			Log. Distance.
	°	′	″	°	′	″	Metres.
Douglas	159	03	35	339	02	38	3·638187
Discovery	295	16	40	115	21	06	3·907971
Gonzales	359	36	50	179	36	51	3·680263

NOTE.—In the azimuth determination from Gonzales—the Tolmie centre of U.S.C. and G.S., and not this tree, was used as mark.

Trial.

G.S.C. 1909.

About 3¼ miles southeast of Parliament buildings, Victoria, on the highest point of Trial island, about 5 feet south of a line between the

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* U.S.C. and G.S. position.

Trial Island lighthouse and the mast of the Radio Telegraph station on Gonzales hill.

Centre.—A $\frac{5}{8}$ inch drill hole, 2 inches deep, in solid rock.

Witness—A $\frac{5}{8}$ inch drill hole, 1 inch deep, about 1 foot below, and 15·3 feet north-northwest of centre. This drill hole is on the surface rock sloping north.

Latitude, 48° 23′ 49″·07. Longitude, 123° 18′ 19″·87.

To Station.	Azimuth.			Back Azimuth.			Log. Distance.
	°	′	″	°	′	″	Metres.
Albert............	85	34	05·51	265	26	22·62	4·1063452
Gonzales	143	33	03·58	323	32	12·79	3·3712096
Witness	155	12	.....	...	..	..... (15·3 feet.)	0·6687072
Discovery..........	241	17	49·36	61	21	23·53	3·8268479

Trial Island Lighthouse.

(*Not occupied*). G.S.C. 1909.

On Trial island, a small rocky island off Victoria. (See description of primary station on the same island).

Latitude, 40° 23′ 44″·3. Longitude, 123° 18′ 14″·8.

To Station.	Azimuth.			Back Azimuth			Log. Distance.
	°	′	″	°	′	″	Metres.
Albert	86	15	46	266	07	59	4·10952
Jocelyn....	133	35	19	313	25	20	4·35554
Douglas...................	164	11	01	344	09	09	4 05372

Victoria, Parliament Buildings.

(*Not occupied*). G.S.C. 1909.

Centre.—Figure of Vancouver on cupola.

Latitude, 48° 25′ 12″·3. Longitude, 123° 22′ 09″·5.

To Station.	Azimuth.			Back Azimuth.			Log. Distance.
	°	′	″	°	′	″	Metres.
Jocelyn.	138	01	32	317	54	28	4·23948
Douglas	191	59	08	12	00	11	3·92178
Gonzales	281	32	02	101	34	03	3·53070

Victoria, Stand Pipe.

G.S.C. 1909.

Centre of the cement stand pipe or water tower on the hill near the corner of St. Charles and Rockland avenue.

Latitude, 48° 25′ 24″·8. Longitude, 123° 20′ 07″·4.

To Station.	Azimuth.			Back Azimuth.			Log. Distance.
	°	′	″	°	′	″	Metres.
Albert	69	25	17	249	18	54	4·05081
Jocelyn	131	34	33	311	25	58	4 27568
Douglas	174	19	49	354	19	21	3·89310

Waterloo.

G.S.C. 1909.

About ten miles southeast of Cowichan Lake post-office, and fourteen miles south of west of Cowichan station on the Esquimalt and Nanaimo railway, on a high, rocky, burnt mountain on the divide between the Koksilah and San Juan rivers. This mountain is visible from the railway on grade just south of Shawnigan lake, and also through gap on the hill in sky-line at one point on the road from Duncan to Cowichan lake. Station is on eastern rocky top.

Centre.—$\frac{5}{8}$ inch hole in solid rock, Ely, London, No. 12 gauge shell in hole.

Witness No. 1.— + cut in solid rock 13·0 feet southwest of centre.

Witness No. 2.— + cut in solid rock 16·0 feet northeast of centre.

Latitude, 48° 41′ 11″·28. Longitude, 123° 55′ 32″·62.

To Station.	Azimuth.			Back Azimuth.			Log. Distance.
	°	′	″	°	′	″	Metres.
Witness No. 1	77	00		...	..	..... (13 feet.)	0·5979592
Whymper	149	41	51·62	329	31	13·32	4·5340000
Brenton	193	37	38·80	13	41	13·14	4·3913960
Prevost	216	16	26·15	36	23	46·27	4·3048280
Witness No. 2	223	18	.....	...	..	..... (16 feet.)	0·6881358
Koksilah	263	04	09·36	83	12	00·73	4·1114441
Jocelyn	299	27	34·66	119	45	32 94	4·5297178
Conspicuous	322	37	10 85*	142	48	34·03*	4·4889631*

* Calculated from Geodetic positions.

Whymper.

G.S.C. 1909.

About eight miles nearly north of the mouth of Cottonwood creek, Cowichan lake, on the highest point of Mt. Whymper (name from B. A. chart) a sharp, rocky peak, north of the Chemainus river. It is the easternmost and highest (about 5,100 feet) of the ragged peaks near the head of the Chemainus.

Centre.—A $\frac{5}{8}$ inch drill hole, 1½ inches deep, in solid rock, over which is built a cairn of rock 5 feet diameter, by 6 feet high.

Witness No. 1.—+, on solid rock 16·8 feet northeast of centre.

Witness No. 2.—A 30/30 brass shell in top of small stump, 6·9 feet southwest of centre.

Witness No. 3.—+, cut in solid rock, 14·1 feet south of centre.

Latitude, 48° 57′ 06″·23. Longitude, 124° 09′ 40″·71.

To Station.	Azimuth.			Back Azimuth.			Log. Distance.
	°	′	″	°	′	″	Metres.
Witness No. 3	7	30	.....	...	..	..... (14·1 feet.)	0·6332349
Witness No. 2	64	00	.....	...	..	..... (6·9 feet.)	0·3228649
Benson	200	16	05·22	20	21	09·02	4·3716225
*Cottle	202	23	23·86*	22	31	04·24*	4·5100740*
Witness No. 1	234	10	.....	...	..	..... (16·8 feet.)	0·7093251
DeCourcy	240	59	29·83	61	18	11·68	4·5373687
Brenton	283	27	25·43	103	41	39·54	4·3752184
Prevost	294	15	06·90	114	33	06·92	4·5059948
Waterloo	329	31	13·32	149	41	51·62	4·5340000

* Calculated from Geodetic position.

Zero Rock.

(*Not occupied*).

U.S.C. and G.S. 1854.

G.S.C. 1909.

A beacon on Zero rock, Cordova bay, off the east coast of Vancouver island, about eight miles northeast of Victoria.

Latitude, 48° 31′ 26″·79. Longitude, 123° 17′ 27″·63.
(U.S.C. and G.S.)

Latitude, 48° 31′ 26″·8. Longitude, 123° 17′ 27″·6.
** (G.S.C.)

** No check on this position.

To Station.	Azimuth.	Back Azimuth.	Log. Distance.
	° ′ ″	° ′ ″	Metres.
Douglas (G.S.C.).........	50 01 14	229 58 46	3·72332
Admiral (G.S.C.).........	147 36 24	327 27 39	4·42602

SPIRIT LEVELING.

During the field season of 1909 levels were run in the vicinity of the city of Victoria, up the Saanich peninsula as far as Sidney, and from Ladysmith to Wellington *via* Nanaimo.

A 14 inch Dumpy level was used, with a New York rod. Backsights and foresights were of equal length, or compensated by balancing, and each line was run at least twice. Steel pins were firmly driven in the ground, and used as turning points. All readings of the rod were made and recorded by instrumentman and by rodman in separate notebooks.

Where possible, brass nails with round heads, driven through brass washers stamped ‘G.S.C., B.M.,’ were used as bench-marks.

Victoria and Vicinity.

The datum for the Victoria and Saanich work is mean sea-level, which was obtained as described below.

The reference is the bench mark at Victoria of the Tidal Survey, described as follows :—

*“At the rear of the old Custom House building on Wharf street at the foot of Broughton street. The top of a brass bolt drilled vertically into the granite rock, at 16 feet (SW) from the northwest corner of the building, with letters B.M. cut beside it on the sloping surface of the rock.”

This bench mark was given an elevation of 9·12 feet above mean sea-level. It was derived as follows :—

	feet.
[1] Tidal Survey B.M., above city datum..................................	105·80
Mean sea-level above city datum observations 1895–1897 (2 years)............	96·75
Mean sea-level above city datum observations 1903–1904 (1 year)............	96·54
Weighted mean of 3 years observations, above city datum..................	96·68
Tidal Survey B.M., above mean sea-level.................................	9·12

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* 38th Annual Report of Department of Marine and Fisheries. Supplement No. I. pp. 8 and 11.

In addition to the elevation of the bench marks described, many heights of indefinite points, such as intersections of streets, railway crossings, etc., are given to the nearest foot.

The work was done under my supervision by Mr. Oscar Barrette.

Victoria and Vicinity.

From Tidal Survey B. M. at old Custom House—via post-office, Humboldt avenue, and Fairfield road, to top of Gonzales, or Shotbolts hill.

	feet.
Tidal Survey B.M. (reference)	9·12
City post-office, southeast corner of Humboldt avenue: cross on coping just west of steps, and 2 feet above sidewalk.	31·558
Humboldt and Blanchard avenues— northwest corner: arrow cut on curb of cement sidewalk, 6 inches from telegraph pole	29·102
Humboldt avenue and Rupert street—northwest corner: arrow cut on curb of cement sidewalk, 6 inches from telegraph pole	28·990
Fairfield road and Vancouver street, southeast corner: arrow cut on curb of cement sidewalk, 15 inches from telegraph pole, and 8 inches from corner	51·296
Fairfield road and Moss street, southwest corner: copper nail and washer on foundation of wooden sidewalk 5 feet from end	43·772
Fairfield road and St. Charles street, northeast corner: copper nail and washer on stump 6 feet east of sidewalk, and 25 feet north of corner	40·906
Fairfield and Foul Bay roads, southwest corner: cross cut on large rock, 20 feet south of Fairfield, and 25 feet west of Foul Bay road	74·888
Foul Bay road: west gate post at east corner of Shotbolt property—copper nail and washer, 4 feet above ground	95·136
Gonzales or Shotbolts hill. Centre of U.S.C. and G.S, and G.S.C. triangulation station. Brass screw set in cement, about 14 feet south, and 6 feet below highest point of rock	215

From City post-office, Victoria, *via* Douglas street and Victoria and Sidney railway to Sidney.

City post-office, B. M. (see page above)	31·558
City Hall, main Douglas Street entrance: cross-cut on cement sidewalk, just north of doorway	57·276
City Hall, Pandora Avenue entrance: arrow on step—B. M. of City Engineer's Department	56·722
Blanchard and North Park streets, southeast corner: cross on large boulder, 6 feet east of inner edge of cement sidewalk on Blanchard street	78·652
Cloverdale avenue—300 feet north of: cross on large rock, about 20 feet west of Victoria and Sidney Railway track	43·403
Cloverdale avenue—2·4 miles north of: copper nail and washer on east end of tie	53·563
Royal Oak station—southwest side of: copper nail and washer on tie	118·640
Beaver Lake station—about 100 feet north of: cross on large rock about 7 feet east of track	201·554
Beaver Lake station—1·3 miles north of: copper nail and washer on cedar stump 3 feet diameter, 60 feet east of track, and 15 feet from lake	203·822

	feet.
Elk lake, water level, June 22, 1909	196
Elk Lake station—500 feet north of, at road crossing; copper nail and washer on stump 3 feet diameter, 10 feet west of track, and northwest of road	235·890
Keating station—450 feet north of: copper nail and washer on stump 3 feet diameter, 30 feet west of track	199·842
Keating station—1 2 miles north of: copper nail and washer on stump 3 feet diameter, 750 feet north of road crossing, and 10 feet east of track	173·532
Saanichton station—copper nail and washer on maple tree 20 feet north of depot, and 30 feet east of track	173·386
Saanichton station—0·3 mile north of: copper nail and washer on northeast end of tie	164·992
Saanichton station—1·6 mile north of: copper nail and washer on cedar stump 4 feet diameter, 8 feet west of track	119·192
Thomas Crossing station: copper nail and washer on frame post at northeast corner of platform	29·565
Sidney station—600 feet south of depot: cross on large stone, east of track	19·814
Sidney, government wharf—Tidal Survey B. M. of the Department of Marine and Fisheries, described as follows: "bronze bolt, cemented vertically in horizontal surface of granite rock, 6 feet north of north line of Beacon avenue, about 3½ feet below extreme high water, and 143 feet shoreward from middle of abutment of the government wharf"	0·118

From city post-office, Victoria,, *via* Esquimalt and Nanaimo railway track to Royal Engineers B. M., and to Langford lake.

City post-office B. M. (see page 23)	31·558
Victoria West—near Russell station, in front of engine shed: cross on large rock about 7 feet north of track	45·228
Victoria West—Russell station—1·10 mile northwest of: copper nail and washer on blazed oak tree, about 3½ feet diameter, north of track	55·455
Crossing Esquimalt and Nanaimo railway, and Esquimalt road	43
Crossing Esquimalt and Nanaimo railway, and Florence street	51
Crossing Esquimalt and Nanaimo railway, and Lamson street	45
Crossing Esquimalt and Nanaimo railway, and Admiral road	64
Crossing Admiral and Esquimalt roads	77
Hospital crossing, (Admiral road) 1,200 feet west of: cross on large rock, about 7 feet north of track	64·321
Esquimalt—'Swan' cottage: cross on small rock, north side Esquimalt road.	69·362
Esquimalt post-office, 500 feet east of: Royal Engineers B.M., on retaining wall built on south side of Esquimalt road opposite Signal hill. A broad arrow on side of wall facing road about 46 feet from eastern end*	36·343
Esquimalt station—200 feet north of: cross on large rock about 7 feet east of track	35·953
Esquimalt station—1·4 miles west of: cross on large rock about 7 feet east of track	56·180
Parsons Bridge station—150 feet west of: cross on large rock about 8 feet north of track	100·162
Langford lake—1·9 miles east of: cross on rock about 8 feet south of track.	228·926
Langford lake—50 feet east of: cross on cement culvert, about 10 feet north of track	212·858
Langford lake, water level, July 2, 1909	207

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* 38th Annual Report, Dept. Marine and Fisheries, Supplement No. 1, p. 10.

Nanaimo, Wellington, and Ladysmith.

The elevations in this vicinity depend on an approximate determination of mean sea-level by the Tidal Survey, deduced from tide observations during six weeks in 1899: from March 26, to May 12, obtained by Captain M. H. Smyth, R.N., of H.M.S. Egeria.*

The value obtained is the half tide level between the average elevation of high water and average low water, above the Admiralty datum, during one lunar month in the above period.

	feet.
Admiralty low water, datum	0·00
B. M. on foreshore	10·25
Mean sea-level	10·50
Summit beacon, Beacon Rock	18·60
B. M. Custom House	51·80

The above figures give the following heights, using mean sea-level as a datum.

Summit of beacon, Beacon Rock	8·10
Foreshore B. M.	0·25
Custom House B. M	41·30

The shore B.M. value is used as initial height in the tabulated statement which follows:—

Nanaimo and Vicinity.

From Nanaimo to Wellington, *via* Esquimalt and Nanaimo Railway track.

Nanaimo—Tidal Survey B. M.: a brass bolt cemented in rock within range of tide, and 38 feet 9 inches northward along shore from point of intersection of the line of northwest end of Custom House building with the line of half tide	0·25
Nanaimo—Custom House: broad arrow cut on southeast side of door in rear wall: facing sea, and 1·4 foot above door sill	41·341
Nanaimo—corner Fitzwilliam street and Selby avenue: cross on step of Occidental Hotel	117·725
Nanaimo station—1·2 mile north of: cross on cement culvert, 7 feet east of track	158·446
Crossing of Church avenue and Commercial street: centre of	52
Crossing of Bastion avenue and Commercial street: centre of	46
Crossing of Bastion avenue and Fitzwilliam street: centre of	70
Crossing of Robson avenue and Fitzwilliam street: centre of	105
Crossing of Esquimalt and Nanaimo Railway track, and Fitzwilliam street: centre of	126
Crossing of Esquimalt and Nanaimo Railway track, and Wentworth street: centre of	117
Crossing of Esquimalt and Nanaimo Railway track, and Pender street: centre of	114

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* Communication from Tidal Survey, W. Bell Dawson, Superintendent, dated March 23, 1910.

	feet.
Crossing of Esquimalt and Nanaimo Railway track, and Comox street: centre of	97
Crossing of Esquimalt and Nanaimo Railway track, and Newcastle road: centre of	123
Crossing of Esquimalt and Nanaimo Railway track, and Stuart street: centre of	130
Crossing of Esquimalt and Nanaimo Railway track, and Northfield road: centre of	259
Northfield station—in front of: copper nail and washer on stump 2 feet diameter, about 10 feet east of track	255·145
Seventy-six mile-post in front of: copper nail and washer, on stump 2 feet in diameter about 20 feet west of track	346·653
Wellington station—50 feet north of: cross on large rock about 8 feet west of track	368·463

From Nanaimo to Ladysmith, *via* Esquimalt and Nanaimo Railway track.

Nanaimo—Occidental Hotel, B. M. (see page 30)	117·725
Nanaimo—corner Selby and Franklin streets: cross on stone foundation on southwest side of Central school-house	113·569
Nanaimo—two miles south of—Chase River crossing, 500 feet north of trestle: cross on large rock about 7 feet east of track	99·780
Starks station—three miles north of: copper nail and washer, on stump 4 feet diameter, about 8 feet west of track	81·524
South Wellington station—0·85 mile north of: cross on large rock about 8 feet east of track	119·364
South Wellington station—0·85 mile south of: cross on large rock about 8 feet west of track near gravel pit siding	152·796
Nanaimo River crossing: cross on capstone of north abutment of bridge, east of track	132·044
Cassidys siding—1·2 mile south of: and about 2,000 feet north of mile-post 63: copper nail and washer on stump 3 feet diameter, 10 feet east of track	112·711
Brenton station—500 feet north of: cross on cement culvert about 10 feet east of track	91·978
Ladysmith—2 miles north of: copper nail and washer on stump 2½ feet diameter, about 20 feet east of track	62·760
Ladysmith station—1,200 feet north of: cross on granite rock about 30 feet west of track	83·055
Ladysmith station—200 feet south of: cross on large rock about 200 feet east of track, and 150 feet from shore	61·478

CANADA

DEPARTMENT OF MINES

GEOLOGICAL SURVEY BRANCH

Hon. W. Templeman, Minister; A. P. Low, Deputy Minister;
R. W. Brock, Director.

SELECTED LIST OF REPORTS AND MAPS

(SINCE 1885)

OF SPECIAL ECONOMIC INTEREST

PUBLISHED BY

THE GEOLOGICAL SURVEY.

Reports of the Mines Section:—

No. 245. Report of Mines Section, 1886.
272 " " 1887.
*300 " " 1888.
301 " " 1889.
334 " " 1890.
335 " " 1891.
360 " " 1892.
572 " " 1893-4.
602 " " 1895.
625 " " 1896.

No. 662. Report of Mines Section, 1897.
698 " " 1898.
718 " " 1899.
744 " " 1900.
800 " " 1901.
835 " " 1902.
893 " " 1903.
928 " " 1904.
971 " " 1905.

Mineral Production of Canada:—

No. *414. Year 1886.
*415 " 1887.
*416 " 1888.
*417 " 1889.
*418 " 1890.
*419 " 1891.
*420 " 1886-91.
*421 " 1892.

No. *422. Year 1893.
*555 " 1894.
*577 " 1895.
*612 " 1896.
623 " 1886-96.
640 " 1897.
671 " 1898.
686 " 1899.

No. 719. Year 1900.
719a " 1901.
813 " 1902.
861 " 1903.
896 " 1904.
924 " 1905.
981 " 1906.

Mineral Resources Bulletins:—

No. *818. Platinum.
851. Coal.
*854. Asbestos.
857. Infusorial Earth.
858. Manganese.
859. Salt.

No. 860. Zinc.
869. Mica.
872. Molybdenum and Tungsten.
*877. Graphite.
880. Peat.

No. 881. Phosphate.
882. Copper.
913. Mineral Pigments.
953. Barytes.
984. Mineral Pigments. (French).

Reports of the Section of Chemistry and Mineralogy:—

No. *102. Year 1874-5.
*110 " 1875-6.
*119 " 1876-7.
126 " 1877-8.
138 " 1878-9.
148 " 1879-80.
156 " 1880-1-2.

No. 169. Year 1882-3-4.
222 " 1885.
246 " 1886.
273 " 1887-8.
299 " 1888-9.
333 " 1890-1.
359 " 1892-3.

No. 580. Year 1894.
616 " 1895.
651 " 1896.
695 " 1898.
724 " 1899.
821 " 1900.
*958 " 1906.

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* Publications marked thus are out of print.

REPORTS.

GENERAL.

745. Altitudes of Canada, by J. White. 1899.
***972. Descriptive Catalogue of Minerals and Rocks, by R. A. A. Johnston and G. A. Young.**
1073. Catalogue of Publications: Reports and Maps (1843-1909)..
1085. Descriptive Sketch of the Geology and Economic Minerals of Canada, by G. A. Young, and Introductory by R. W. Brock. Maps No. 1084; No. 1042 (second edition), scale 100 m.=1 in.
1086. French translation of Descriptive Sketch of the Geology and Economic Minerals of Canada, by G. A. Young, and Introductory by R. W. Brock. Maps No. 1084; No. 1042 (second edition), scale 100 m.=1 in.
1107. Part II. Geological position and character of the oil-shale deposits of Canada, by R. W. Ells.

YUKON.

***260. Yukon district, by G. M. Dawson. 1887. Maps No. 274, scale 60 m.=1 in.; Nos. 275 and 277, scale 8 m=1 in.**
***295. Yukon and Mackenzie basins, by R. G. McConnell. 1889. Map No. 304, scale 48 m.=1 in.**
687. Klondike gold fields (preliminary), by R. G. McConnell. 1900. Map No. 688, scale 2 m.=1 in.
884. Klondike gold fields, by R. G. McConnell. 1901. Map No. 772, scale 2 m.=1 in.
*909. Windy Arm, Tagish lake, by R. G. McConnell. 1906. Map No. 916, scale 2 m.=1 in.
943. Upper Stewart river, by J. Keele. Map No. 938, scale 8 m.=1 in. } Bound together.
951. Peel and Wind rivers, by Chas. Camsell. Map No. 942, scale 8 m.=1 in. }
979. Klondike gravels, by R. G. McConnell. Map No. 1011, scale 40 ch.=1 in.
982. Conrad and Whitehorse mining districts, by D. D. Cairnes. 1901. Map No. 990, scale 2 m.=1 in.
1016. Klondike Creek and Hill gravels, by R. G. McConnell. (French). Map No. 1011, scale 40 ch.=1 in.
1050. Whitehorse Copper Belt, by R. G. McConnell. Maps Nos. 1,026, 1,041, 1,044-1,049.
1097. Reconnaissance across the Mackenzie mountains on the Pelly, Ross, and Gravel rivers, Yukon, and North West Territories, by Joseph Keele. Map No. 1099, scale 8 m.=1 in.

BRITISH COLUMBIA.

212. The Rocky mountains (between latitudes 49° and 51° 30°), by G. M. Dawson. 1885. Map No. 223, scale 6 m.=1 in. Map No. 224, scale 1½ m.=1 in.
*235. Vancouver island, by G. M. Dawson. 1886. Map No. 247, scale 8 m.=1 in.
236. The Rocky mountains, geological structure, by R. G. McConnell. 1886. Map No. 248, scale 2 m.=1 in.
263. Cariboo mining district, by A. Bowman. 1887. Maps Nos. 278-281.
*271. Mineral wealth, by G. M. Dawson.
***294. West Kootenay district, by G. M. Dawson. 1888-9. Map No. 303, scale 8 m.=1 in.**
***573. Kamloops district, by G. M. Dawson. 1894. Maps Nos. 556 and 557, scale 4 m. =1 in.**
574. Finlay and Omineca rivers, by R. G. McConnell. 1894. Map No. 567, scale 8 m.=1 in.
743. Atlin Lake mining division, by J. C. Gwillim. 1899. Map No. 742, scale 4 m.=1 in.
939. Rossland district, by R. W. Brock. Map No. 941, scale 1,600 ft.=1 in.
940. Graham island, by R. W. Ells. 1905. Maps No. 921, scale 4 m.=1 in.; No. 922, scale 1 m.=1 in.
986. Similkameen district, by Chas. Camsell. Map No. 987, scale 400 ch.=1 in.

***Publications marked thus are out of print.**

988. Telkwa river and vicinity, by W. W. Leach. Map No. 989, scale 2 m.=1 in.

996. Nanaimo and New Westminster districts, by O. E. LeRoy. 1907. Map No. 997, scale 4 m.=1 in.

1035. Coal-fields of Manitoba, Saskatchewan, Alberta, and Eastern British Columbia, by D. B. Dowling.

ALBERTA.

***237. Central portion, by J. B. Tyrrell. 1886. Maps Nos. 249 and 250, scale 8 m.=1 in.**

324. Peace and Athabaska Rivers district, by R. G. McConnell. 1890-1. Map No. 336, scale 48 m.=1 in.

703. Yellowhead Pass route, by J. McEvoy. 1898. Map No. 676, scale 8 m.=1 in.

***949. Cascade coal-fields, by D. B. Dowling. Maps (8 sheets) Nos. 929-936, scale 1 m.=1 in.**

968. Moose Mountain district, by D. D. Cairnes. Maps No. 963, scale 2 m.=1 in.; No. 966, scale 1 m.=1 in.

1035. Coal-fields of Manitoba, Saskatchewan, Alberta, and Eastern British Columbia, by D. B. Dowling. Map No. 1,010, scale 35 m.=1 in.

SASKATCHEWAN.

213. Cypress hills and Wood mountain, by R. G. McConnell. 1885. Maps Nos. 225 and 226, scale 8 m.=1 in.

601. Country between Athabaska lake and Churchill river, by J. B. Tyrrell and D. B. Dowling. 1895. Map No. 957, scale 25 m.=1 in.

868. Souris River coal-field, by D. B. Dowling. 1902.

1035. Coal-fields of Manitoba, Saskatchewan, Alberta, and Eastern British Columbia, by D. B. Dowling. Map No. 1,010, scale 35 m.=1 in.

MANITOBA.

264. Duck and Riding mountains, by J. B. Tyrrell. 1887-8. Map No. 282, scale 8 m.=1 in.

296. Glacial Lake Agassiz, by W. Upham. 1889. Maps Nos. 314, 315, 316.

325. Northwestern portion, by J. B. Tyrrell. 1890-1. Maps Nos. 339 and 350, scale 8 m.=1 in.

704. Lake Winnipeg (west shore), by D. B. Dowling. 1898. Map No. 664, scale 8 m.=1 in.

705. Lake Winnipeg (east shore), by J. B. Tyrrell. 1898. Map No. 664, scale 8 m=1 in.

Bound together.

1035. Coal-fields of Manitoba, Saskatchewan, Alberta, and Eastern British Columbia, by D. B. Dowling. Map No. 1010, scale 35 m=1 in.

NORTH WEST TERRITORIES.

217. Hudson bay and strait, by R. Bell. 1885. Map No. 229, scale 4 m.=1 in.

238. Hudson bay, south of, by A. P. Low. 1886.

239. Attawapiskat and Albany rivers, by R. Bell. 1886.

244. Northern portion of the Dominion, by G. M. Dawson. 1886. Map No. 255, scale 200 m.=1 in.

267. James bay and country east of Hudson bay, by A. P. Low.

578. Red lake and part of Berens river, by D. B. Dowling. 1894. Map No. 576, scale 8 m.=1 in.

*584. Labrador peninsula, by A. P. Low. 1895. Maps Nos. 585-588, scale 25 m.=1 in.

618. Dubawnt, Kazan, and Ferguson rivers, by J. B. Tyrrell. 1896. Map No. 603, scale 25 m.=1 in.

657. Northern portion of the Labrador peninsula, by A. P. Low.

680. South Shore Hudson strait and Ungava bay, by A. P. Low. Map No. 699, scale 25 m.=1 in.

713. North Shore Hudson strait and Ungava bay, by R. Bell. Map No. 699, scale 25 m.=1 in.

Bound together.

725. Great Bear lake to Great Slave lake, by J. M. Bell. 1900.

778. East Coast Hudson bay, by A. P. Low. 1900. Maps Nos. 779, 780, 781, scale 8 m.=1 in.

786-787. Grass River region, by J. B. Tyrrell and D. B. Dowling. 1900.

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815. Ekwan river and Sutton lakes, by D. B. Dowling. 1901. Map No. 751, scale 50 m. = 1 in.
819. Nastapoka islands, Hudson bay, by A. P. Low. 1900.
905. The Cruise of the *Neptune*, by A. P. Low. 1905.
1069. French translation report on an exploration of the East coast of Hudson bay, from Cape Wolstenholme to the south end of James bay, by A. P. Low. Maps Nos. 779, 780, 781, scale 8 m. = 1 in.; No. 785, scale 50 m. = 1 in.
1097. Reconnaissance across the Mackenzie mountains on the Pelly, Ross, and Gravel rivers, Yukon, and North West Territories, by Joseph Keele. Map No. 1099, scale 8 m. = 1 in.

ONTARIO.

215. Lake of the Woods region, by A. C. Lawson. 1885. Map No. 227, scale 2 m. = 1 in.
***265.** Rainy Lake region, by A. C. Lawson. 1887. Map No. 283, scale 4 m. = 1 in.
266. Lake Superior, mines and mining, by E. D. Ingall. 1888. Maps No. 285, scale 4 m. = 1 in.; No. 286, scale 20 ch. = 1 in.
326. Sudbury mining district, by R. Bell. 1890-1. Map No. 343, scale 4 m. = 1 in.
327. Hunter island, by W. H. C. Smith. 1890-1. Map No. 342, scale 4 m. = 1 in.
332. Natural Gas and Petroleum, by H. P. H. Brumell. 1890-1. Maps Nos. 344-349.
357. Victoria, Peterborough, and Hastings counties, by F. D. Adams. 1892-3.
627. On the French River sheet, by R. Bell. 1896. Map No. 570, scale 4 m. = 1 in.
678. Seine river and Lake Shebandowan map-sheets, by W. McInnes. 1897. Maps Nos. 589 and 560, scale 4 m. = 1 in.
723. Iron deposits along the Kingston and Pembroke railway, by E. D. Ingall. 1900. Map No. 626, scale 2 m. = 1 in.; and plans of 13 mines.
739. Carleton, Russell, and Prescott counties, by R. W. Ells. 1899. (*See* No. 739, Quebec.)
741. Ottawa and vicinity, by R. W. Ells. 1900.
790. Perth sheet, by R. W. Ells. 1900. Map No. 789, scale 4 m. = 1 in.
961. Sudbury Nickel and Copper deposits, by A. E. Barlow (Reprint). Maps Nos. 775, 820, scale 1 m. = 1 in.; Nos. 824, 825, 864, scale 400 ft. = 1 in.
962. Nipissing and Timiskaming map-sheets, by A. E. Barlow. (Reprint). Maps Nos. 599, 606, scale 4 m. = 1 in.; No. 944, scale 1 m. = 1 in.
965. Sudbury Nickel and Copper deposits, by A. E. Barlow. (French).
970. Report on Niagara Falls, by J. W. Spencer. Maps Nos. 926, 967.
977. Report on Pembroke sheet, by R. W. Ells. Map No. 660, scale 4 m. = 1 in.
980. Geological reconnaissance of a portion of Algoma and Thunder Bay district, Ont., by W. J. Wilson. Map No. 964, scale 8 m. = 1 in.
1081. On the region lying north of Lake Superior, between the Pic and Nipigon rivers, Ont., by W. H. Collins. Map No. 964, scale 8 m. = 1 in.
Bound together.
992. Report on Northwestern Ontario, traversed by National Transcontinental railway, between Lake Nipigon and Sturgeon lake, by W. H. Collins. Map No. 993, scale 4 m. = 1 in.
998. Report on Pembroke sheet, by R. W. Ells. (French). Map No. 660, scale 4 m. = 1 in.
999. French translation Gowganda Mining Division, by W. H. Collins. Map No. 1076, scale 1 m. = 1 in.
1038. French translation report on the Transcontinental Railway location between Lake Nipigon and Sturgeon lake, by W. H. Collins. Map No. 993, scale 4 m. = 1 in.
1059. Geological reconnaissance of the region traversed by the National Transcontinental railway between Lake Nipigon and Clay lake, Ont., by W. H. Collins. Map No. 993, scale 4 m. = 1 in.
1075. Gowganda Mining Division, by W. H. Collins. Map No. 1,076, scale 1 m. = 1 in.
1082. Memoir No. 6.—Geology of the Haliburton and Bancroft areas, Ont., by Frank D. Adams and Alfred E. Barlow. Maps No. 708, scale 4 m. = 1 in.; No. 770, scale 2 m. = 1 in.
1114. French translation Geological reconnaissance of a portion of Algoma and Thunder Bay district, Ont., by W. J. Wilson. Map No. 964, scale 8 m. = 1 in.
1119. French translation on the region lying north of Lake Superior, between the Pic and Nipigon rivers, Ont., by W. H. Collins. Map No. 964, scale 8 m. = 1 in.
Bound together.

***Publications marked thus are out of print.**

QUEBEC.

216. Mistassini expedition, by A. P. Low. 1884-5. Map No. 228, scale 8 m. =1 in.
240. Compton, Stanstead, Beauce, Richmond, and Wolfe counties, by R. W. Ells. 1886. Map No. 251 (Sherbrooke sheet), scale 4 m. =1 in.
268. Megantic, Beauce, Dorchester, Levis, Bellechasse, and Montmagny counties, by R. W. Ells. 1887-8. Map No. 287, scale 40 ch. =1 in.
297. Mineral resources, by R. W. Ells. 1889.
328. Portneuf, Quebec, and Montmagny counties, by A. P. Low. 1890-1.
579. Eastern Townships, Montreal sheet, by R. W. Ells and F. D. Adams. 1894. Map No. 571, scale 4 m. =1 in.
591. Laurentian area north of the Island of Montreal, by F. D. Adams. 1895. Map No. 590, scale 4 m. =1 in.
670. Auriferous deposits, southeastern portion, by R. Chalmers. 1895. Map No. 667, scale 8 m. =1 in.
707. Eastern Townships, Three Rivers sheet, by R. W. Ells. 1898.
739. Argenteuil, Ottawa, and Pontiac counties, by R. W. Ells. 1899. (*See* No. 739, Ontario).
788. Nottaway basin, by R. Bell. 1900. *Map No. 702, scale 10 m. =1 in.
863. Wells on Island of Montreal, by F. D. Adams. 1901. Maps Nos. 874, 875, 876.
923. Chibougamau region, by A. P. Low. 1905.
962. Timiskaming map-sheet, by A. E. Barlow. (Reprint). Maps Nos. 599, 606, scale 4 m. =1 in.; No. 944, scale 1 m. =1 in.
974. Report on Copper-bearing rocks of Eastern Townships, by J. A. Dresser. Map No. 976, scale 8 m. =1 in.
975. Report on Copper-bearing rocks of Eastern Townships, by J. A. Dresser. (French).
998. Report on the Pembroke sheet, by R. W. Ells. (French).
1028. Report on a Recent Discovery of Gold near Lake Megantic, Que., by J. A. Dresser. Map No. 1029, scale 2 m. =1 in.
1032. Report on a Recent Discovery of Gold near Lake Megantic, Que., by J. A. Dresser. (French). Map No. 1029, scale 2 m. =1 in.
1052. French translation report on Artesian wells in the Island of Montreal, by Frank D. Adams and O. E. LeRoy. Maps Nos. 874, scale, 4 m. =1 in.; No. 875, scale 3,000 ft. =1 in.; No. 876.
1144. Reprint of Summary Report on the Serpentine Belt of Southern Quebec, by J. A. Dresser.

NEW BRUNSWICK.

218. Western New Brunswick and Eastern Nova Scotia, by R. W. Ells. 1885. Map No. 230, scale 4 m. =1 in.
219. Carleton and Victoria counties, by L. W. Bailey. 1885. Map No. 231, scale 4 m. =1 in.
242. Victoria, Restigouche, and Northumberland counties, N.B., by L. W. Bailey and W. McInnes. 1886. Map No. 254, scale 4 m. =1 in.
269. Northern portion and adjacent areas, by L. W. Bailey and W. McInnes. 1887-8. Map No. 290, scale 4 m. =1 in.
330. Temiscouata and Rimouski counties, by L. W. Bailey and W. McInnes. 1890-1. Map No. 350, scale 4 m. =1 in.
661. Mineral resources, by L. W. Bailey. 1897. Map No. 675, scale 10 m. =1 in.
New Brunswick geology, by R. W. Ells. 1887.
799. Carboniferous system, by L. W. Bailey. 1900. }
803. Coal prospects in, by H. S. Poole. 1900. } Bound together.
983. Mineral resources, by R. W. Ells. Map No. 969, scale 16 m. =1 in.
1034. Mineral resources, by R. W. Ells. (French). Map No. 969, scale 16 m. =1 in.

NOVA SCOTIA.

243. Guysborough, Antigonish, Pictou, Colchester, and Halifax counties, by Hugh Fletcher and E. R. Faribault. 1886.
331. Pictou and Colchester counties, by H. Fletcher. 1890-1.
358. Southwestern Nova Scotia (preliminary), by L. W. Bailey. 1892-3. Map No. 362, scale 8 m. =1 in.
628. Southwestern Nova Scotia, by L. W. Bailey. 1896. Map No. 641, scale 8 m. =1 in.
685. Sydney coal-field, by H. Fletcher. Maps Nos. 652, 653, 654, scale 1 m. =1 in.
797. Cambrian rocks of Cape Breton, by G. F. Matthew. 1900.
871. Pictou coal-field, by H. S. Poole. 1902. Map No. 833, scale 25 ch. =1 in.

***Publications marked thus are out of print.**

MAPS.

1042. Dominion of Canada. Minerals. Scale 100 m.=1 in.

YUKON.

805. Explorations on Macmillan, Upper Pelly, and Stewart rivers, scale 8 m.=1 in.
891. Portion of Duncan Creek Mining district, scale 6 m.=1 in.
894. Sketch Map Kluane Mining district, scale 6 m.=1 in.
*916. Windy Arm Mining district, Sketch Geological Map, scale 2 m.=1 in.
990. Conrad and Whitehorse Mining districts, scale 2 m.=1 in.
991. Tantalus and Five Fingers coal mines, scale 1 m.=1 in.
1011. Bonanza and Hunker creeks. Auriferous gravels. Scale 40 chains=1 in.
1033. Lower Lake Laberge and vicinity, scale 1 m.=1 in.
1041. Whitehorse Copper belt, scale 1 m.=1 in.
1026, 1044-1049. Whitehorse Copper belt. Details.

BRITISH COLUMBIA.

278. Cariboo Mining district, scale 2 m.=1 in.
604. Shuswap Geological sheet, scale 4 m.=1 in.
*771. Preliminary Edition, East Kootenay, scale 4 m.=1 in.
767. Geological Map of Crowsnest coal-fields, scale 2 m.=1 in.
791. West Kootenay Minerals and Striæ, scale 4 m.=1 in.
*792. West Kootenay Geological sheet, scale 4 m.=1 in.
*828. Boundary Creek Mining district, scale 1 m.=1 in.
890. Nicola coal basin, scale 1 m.=1 in.
941. Preliminary Geological Map of Rossland and vicinity, scale 1,600 ft.=1 in.
987. Princeton coal basin and Copper Mountain Mining camp, scale 40 ch.=1 in.
989. Telkwa river and vicinity, scale 2 m.=1 in.
997. Nanaimo and New Westminster Mining division, scale 4 m.=1 in.
1001. Special Map of Rossland. Topographical sheet. Scale 400 ft.=1 in.
1002. Special Map of Rossland. Geological sheet. Scale 400 ft.=1 in.
1003. Rossland Mining camp. Topographical sheet. Scale 1,200 ft.=1 in.
1004. Rossland Mining camp. Geological sheet. Scale 1,200 ft.=1 in.
1068. Sheep Creek Mining camp. Geological sheet. Scale 1 m.=1 in.
1074. Sheep Creek Mining camp. Topographical sheet. Scale 1 m.=1 in.

ALBERTA.

594-596. Peace and Athabaska rivers, scale 10 m.=1 in.
*808. Blairmore-Frank coal-fields, scale 180 ch.=1 in.
892. Costigan coal basin, scale 40 ch=1 in.
929-936. Cascade coal basin. Scale 1 m.=1 in.
963-966. Moose Mountain region. Coal Areas. Scale 2 m.=1 in.
1010. Alberta, Saskatchewan, and Manitoba. Coal Areas. Scale 35 m.=1 in.
1117. 5A.—Edmonton. (Topography). Scale ½ m.=1 in.
1118. 6A.—Edmonton. (Clover Bar Coal Seam). Scale ½ m.=1 in.
1132. 7A.—Bighorn Coal-field. Scale 2 m.=1 in.

SASKATCHEWAN.

1010. Alberta, Saskatchewan, and Manitoba. Coal Areas. Scale 35 m.=1 in.

MANITOBA.

804. Part of Turtle mountain showing coal areas, scale 1½ m.=1 in.
1010. Alberta, Saskatchewan, and Manitoba. Coal Areas. Scale 35 m.=1 in.

*Publications marked thus are out of print.

ONTARIO.

227. Lake of the Woods sheet, scale 2 m. =1 in.
*283. Rainy Lake sheet, scale 4 m. =1 in.
*342. Hunter Island sheet, scale 4 m. =1 in.
343. Sudbury sheet, scale 4 m. =1 in.
373. Rainy River sheet, scale 2 m. =1 in.
560. Seine River sheet, scale 4 m. =1 in.
570. French River sheet, scale 4 m. =1 in.
*589. Lake Shebandowan sheet, scale 4 m. =1 in.
599. Timiskaming sheet, scale 4 m. =1 in. (New Edition 1907).
605. Manitoulin Island sheet, scale 4 m. =1 in.
606. Nipissing sheet, scale 4 m. =1 in. (New Edition 1907).
660. Pembroke sheet, scale 4 m. =1 in.
663. Ignace sheet, scale 4 m. =1 in.
708. Haliburton sheet, scale 4 m. =1 in.
720. Manitou Lake sheet, scale 4 m. =1 in.
*750. Grenville sheet, scale 4 m. =1 in.
770. Bancroft sheet, scale 2 m. =1 in.
775. Sudbury district, Victoria mines, scale 1 m. =1 in.
*789. Perth sheet, scale 4 m. =1 in.
820. Sudbury district, Sudbury, scale 1 m. =1 in.
824-825. Sudbury district, Copper Cliff mines, scale 400 ft. =1 in.
852. Northeast Arm of Vermilion Iron ranges, Timagami, scale 40 ch. =1 in.
864. Sudbury district, Elsie and Murray mines, scale 400 ft. =1 in.
903. Ottawa and Cornwall sheet, scale 4 m. =1 in.
944. Preliminary Map of Timagami and Rabbit lakes, scale 1 m. =1 in.
964. Geological Map of parts of Algoma and Thunder bay, scale 8 m. =1 in.
1023. Corundum Bearing Rocks. Central Ontario. Scale 17½ m. =1 in.
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